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Alcoholic fermentation.—KOHL⁶ has carried on a study of the series of reactions involved in alcoholic fermentation. He finds that lactic acid is not fermented either by zymase, compressed yeast, or bottom yeast; that 1 per cent or more of lactic acid stops the self-fermentation of living yeast and strongly reduces its fermentative activity in glucose; but that zymase, compressed yeast, and brewer's yeast ferment sodium lactate speedily. It is evident that if at one stage of alcoholic fermentation lactic acid is found, it must exist as a salt. The fact that zymase will not ferment lactic acid has been urged against BUCHNER'S conception that alcoholic fermentation takes place in two steps; glucose is transformed to lactic acid by zymase, and lactic acid to alcohol and carbon dioxid by lacticidase. KOHL'S finding answers this argument. While he thinks the fermentation occurs in these two steps, he differs in his view of the enzymes that carry on the processes. He concludes that catalase transforms the glucose to lactic acid, and that zymase carries the splitting on to alcohol and carbon dioxid. In a glycerin extract of crushed yeast, he found neither an oxidase nor a peroxidase, as shown by an alcoholic solution of quaiac; yet it contained an enzyme capable of oxidizing various phenols, and these oxidations he believes are carried on by the catalase present. This extract when filtered produces lactic acid in the presence of glucose—it likewise produces a trace of oxalic acid. He does not know whether both these oxidations are due to the same enzyme. He urges that this view locates the function of the catalase of yeast, a point not before settled. In case zymase is present, the oxidations go no farther than lactic acid, which is then transformed to alcohol and carbon dioxid. In its absence, the oxidation is carried still farther, producing various other acids. He applies his view to the explanation of the results of HARDEN and YOUNG with the gelatin filter, but cannot be said in any degree to further elucidate them. This subject, because of its close bearing on respiration and energy-production in the organism, certainly needs much attention from biological chemists. It is disappointing, however, that the contributions are mainly hypotheses with sparse experimental evidence, rather than records of careful chemical studies.—WILLIAM CROCKER.

***Adoxa moschatellina*.**—The uncertain systematic position of *Adoxa* induced LAGERBERG⁷ to undertake a complete morphological and cytological investigation of this peculiar genus. The development of the various organs was traced, and this comparatively simple part of the study is illustrated by figures in the text; while the cytological details of spermatogenesis, oogenesis, and fertilization are illustrated by three large plates. The following are some of the principal features: The ovule has a single integument and a single archesporial cell which

⁶ KOHL, F. G., Ueber das Wesen der Alkoholgärung. Beih. Bot. Centralbl. 29:115-126. 1910.

⁷ LAGERBERG, T., Studien über die Entwicklungsgeschichte und systematische Stellung von *Adoxa moschatellina*. Kungl. Sv. Vet. Akad. Handl. 44:1-86. pls. 1-3. figs. 23. 1909.

develops directly into the embryo sac, as in *Lilium*, the four megaspores, not separated by walls, all taking part in the formation of the sac. The two male cells retain their form even after passing to the end of the pollen tube. Double fertilization was observed. The diploid and haploid chromosome numbers are 38 and 18. The first four cells of the endosperm are long and tubelike, extending from the egg to the antipodals.

Various genera of the Saxifragaceae, Araliaceae, Caprifoliaceae, and Ranunculaceae, with which various systematists have supposed *Adoxa* to be related, were studied for comparison, and one of these genera (*Sambucus*) shows so many resemblances that the similarity could hardly be accidental. For instance, both have ovules with a single integument and a single archesporial cell which develops into the embryo sac according to the *Lilium* type; the wall of the anther, the cytological details of the development of the pollen (including the number of chromosomes), and the structure of the mature pollen grain are so identical that the two forms can hardly be distinguished in these respects; the long persistence of the organized male cells is the same in both, and resemblances in the grosser morphology were already well known. The conclusion is reached, and it seems to be based upon an unusually wide range of evidence, that there is no need for the family Adoxaceae, and that *Adoxa* should be placed in the Caprifoliaceae in the tribe Sambuceae.—CHARLES J. CHAMBERLAIN.

Geotropism.—Under a very pretentious title, GILTAY⁸ discusses and describes a number of experiments on some of the “fundamental questions of geotropism.” The article is more a contribution to the teaching of the subject than to knowledge. He gives an excellent method for lecture demonstration of the force with which a geotropically bending primary root turns downward. He also points out that we have never proved that gravity is the only stimulus involved in the turning of the primary root toward the center of the earth. The only evidence we have for this is qualitative. KNIGHT showed (1806) that as the centrifugal force was increased on a centrifuge with a vertical axis the root and stem took more nearly the horizontal position; but he did not show any relation between the position of the stem and root and the resultant of the two forces which he assumed to be involved (gravity and centrifugal force). In short, KNIGHT showed that at least in part the so-called geotropic stimulus is the gravity stimulus, but he did not show that the gravity stimulus is the only stimulus involved. GILTAY urges the necessity of showing that the position taken by orthotropic organs on such a centrifuge is the resultant of the two forces, if we are to be assured that the geotropic stimulus is identical in nature with the gravity stimulus and with the stimulus of centrifugal force. The resultant of the two forces ought of course to be the position taken, provided the two forces do not differ from each other by many fold, for we must remember that WEBER’S

⁸ GILTAY, E., Einige Betrachtungen und Versuche über Grundfragen beim Geotropismus der Wurzel. Zeitschr. Botanik 2:305-331. 1910.